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Agrément Certificate

14/5134

Product Sheet 4

KINGSPAN KOOLTHERM RANGE FOR FLOORS, WALLS AND PITCHED ROOFS

KOOLTHERM K8

This Agrément Certificate Product Sheet⁽¹⁾ relates to Kooltherm K8, comprising of rigid closed-cell foil-faced phenolic foam board, for use as partial fill insulation to reduce the thermal transmittance of cavity walls in buildings of a domestic or non-domestic nature with masonry inner and outer leaves, without height restriction (additional requirements apply for buildings above 12 m). The product is installed during construction.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

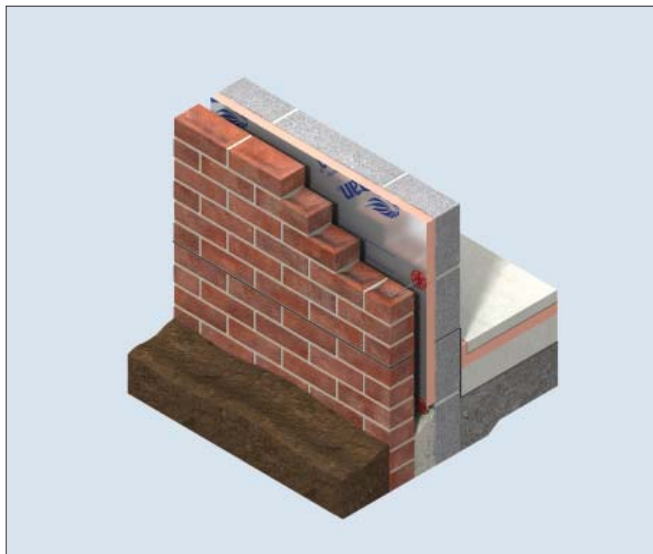
Thermal performance — the product has a thermal conductivity* (λ_D value) of $0.021 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for thicknesses < 45 mm and $0.020 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for thicknesses ≥ 45 mm (see section 6).

Liquid water penetration — the product will resist water transfer across the cavity of the walls (see section 7).

Condensation — the product will contribute to limiting the risk of condensation (see section 8).

Behaviour in relation to fire — the product, once installed, will not prejudice the fire resistance of the wall (see section 9).

Durability — the product will have a life equivalent to that of the wall structure in which it is incorporated (see section 12).



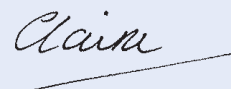
The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément



Date of First issue: 24 July 2014

John Albon — Head of Approvals
Energy and Ventilation



Claire Curtis-Thomas
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Kooltherm K8, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	B3(4)	Internal fire spread (structure)
Comment:		The product can contribute to satisfying this Requirement. See Sections 9.1 and 9.5 of this Certificate.
Requirement:	C2(a)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See section 7.1 of this Certificate. See section 7.6 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See section 7.2 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to satisfying this Requirement. See sections 8.1 and 8.3 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	26	CO₂ emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The product can contribute to satisfying these Regulations. See sections 6.2 and 6.3 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.6	Spread to neighbouring buildings
Comment:		The product is not non-combustible but may be used in walls of buildings in accordance with the exceptions permitted in this Standard, with reference to clauses 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See sections 9.1 and 9.5 of this Certificate
Standard:	3.4	Moisture from the ground
Comment:		The product can contribute to satisfying this Standard with reference to clauses 3.4.1 ⁽¹⁾⁽²⁾ and 3.4.5 ⁽¹⁾⁽²⁾ to this Standard. See section 7.1 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.3 ⁽¹⁾⁽²⁾ . See section 7.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See sections 8.2 and 8.3 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		Walls incorporating the product can satisfy, or contribute to satisfying these Standards, with reference to clauses 6.1.1 ⁽¹⁾ , 6.1.2 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.5 ⁽²⁾ , 6.2.9 ⁽¹⁾ , 6.2.10 ⁽¹⁾ , 6.2.11 ⁽²⁾ and 6.2.13 ⁽²⁾ . See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting the bronze level of sustainability as defined in this Standard. In addition, the product can contribute to a construction meeting a higher level of sustainability as defined in this Standard with reference to clause 7.1.4 ⁽¹⁾⁽²⁾ [Aspect 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾⁽²⁾ [Aspect 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾] and 7.1.7 ⁽¹⁾⁽²⁾ [Aspect 1 ⁽¹⁾⁽²⁾]. See section 6.2 of this Certificate.
Regulation:	12	Building standards applicable to construction
Comment:		All Comments made in relation to the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012

Regulation:	23	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	28(a)	Resistance to moisture and weather
Comment:		The product can contribute to satisfying this Regulation. See section 7.1 of this Certificate.

Regulation:	28(b)	Resistance to moisture and weather
Comment:		The product can contribute to satisfying this Regulation. See section 7.2 of this Certificate.
Regulation:	29	Condensation
Comment:		The product can contribute to satisfying this Regulation. See section 8.3 of this Certificate.
Regulation:	35(4)	Internal fire spread – structure
Comment:		The product can contribute to satisfying this Regulation. See sections 9.1 and 9.5 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
	40(2)	Target carbon dioxide emission rate
Comment:		The product can contribute to satisfying these Regulations. See section 6 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 3 Delivery and site handling (3.3) of this Certificate.

Additional Information

NHBC Standards 2014

Subject to a 50 mm minimum residual cavity being maintained, NHBC accepts the use of Kooltherm K8, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6.1 *External masonry walls*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European standard BS EN 13166 : 2012. An asterisk (*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

Kooltherm K8, (see Figure 1) comprises of rigid closed-cell foil-faced phenolic foam board manufactured to comply with BS EN 13166 : 2012, with the nominal characteristics given in Table 1 of this Certificate.

Table 1 Nominal characteristics

Length (mm)	1200
Width (mm)	450
Insulation thickness* (mm)	25 to 140 (in 5 mm increments)
Edge profile	Plain

2 Manufacture

2.1 Raw materials are injected onto the lower foil-facer on a conveyor belt. The exothermic reaction expands the foam, which then comes into contact with the upper foil-facer. An automated process cures and cuts the product to the required size.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Kingspan Insulation Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by The Loss Prevention Certification Board (LPCB) (Certificate 388).

3 Delivery and site handling

3.1 The product is delivered to site shrink-wrapped in polythene packs containing a label with the product description and characteristics, the manufacturer's name, and the BBA identification mark incorporating the number of this Certificate.

3.2 Ideally, boards should be stored inside a building. If, however, outside storage cannot be avoided, then the boards should be stacked clear of the ground and covered with an opaque polythene sheet or weatherproof tarpaulin. The product must be protected from rain, snow and prolonged exposure to sunlight. Boards that have been allowed to get wet or that are damaged must not be used. Nothing should be stored on top of boards.

3.3 The product must not be exposed to a naked flame or other ignition sources. The product must not be exposed to solvents or other chemicals.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Kooltherm K8.

Design Considerations

4 General

4.1 Kooltherm K8 is satisfactory for use as partial fill cavity wall insulation and is effective in reducing the thermal transmittance (U value) of new external cavity walls with masonry inner and outer leaves (where masonry includes clay and calcium silicate bricks, concrete blocks, and natural and reconstituted stone blocks). The product is for use in domestic and non-domestic buildings without height restriction (additional requirements apply above 12 m). It is essential that such walls are designed and constructed to incorporate the precautions given in this Certificate to prevent moisture penetration.

4.2 Buildings subject to the national Building Regulations should be designed and constructed in accordance with the relevant recommendations of:

- BS EN 1996-1-1 : 2005, BS EN 1996-1-2 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006 and their respective UK National Annexes
- BS EN 845-1 : 2013 and BS 8000-3 : 2001.

4.3 Other new buildings not subject to these Regulations should also be built in accordance with the Standards given in section 4.2 of this Certificate.

4.4 Cavity wall ties with insulation-retaining fixings and, if required, any additional ties to BS EN 845-1 : 2013 should be used for structural stability in accordance with BS EN 1996-1-1 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006.

4.5 The use of cavity battens or boards is strongly recommended to prevent thermal bridging by mortar droppings.

Buildings up to and including 12 metres high

4.6 The minimum residual cavity width to be maintained during construction must be 25 mm. To achieve this, a greater nominal residual cavity width may need to be specified at the design stage (to allow for inaccuracies inherent in the building process). The specifier may either:

- design a nominal residual cavity width of 50 mm (a residual cavity nominally at least 50 mm wide will be required by the NHBC), or
- design a cavity width which takes into account the dimensional tolerances of the components which make up the wall (by reference to the British Standards relating to the bricks, blocks and boards, or by using the data from the respective manufacturers). Allowances may need to be made for the quality of building operatives and the degree of site supervision or control available. The limitations in respect of exposure of the proposed building as set out in Table 2 must also be observed.

Table 2 Maximum allowable total exposure factor of different constructions

Construction	Maximum allowable exposure factor $E^{(1)}$
All external masonry walls protected by: rendering (to BS EN 13914-1 : 2005) tile hanging slate hanging timber, plastic or metal weatherboarding or cladding	No restriction
One or more external masonry walls constructed from facing clay brickwork or natural stone, the porosity of which exceeds 20% by volume. Mortar joints must be flush pointed or weatherstruck	100
One or more external masonry walls constructed from calcium silicate bricks, concrete blocks, reconstituted stone, or natural stone, the porosity of which exceeds 20% by volume, or any material with raked mortar joints	88

(1) To BS 5618 : 1985

4.7 An external render coat or other suitable finish should be applied in locations where such application would be normal practice; care should be taken to ensure that the residual cavity is not bridged by mortar.

Buildings over 12 metres in height

4.8 The width of the residual clear cavity to be achieved is to be in excess of 50 mm, and the following requirements apply:

- from ground level, the maximum height of continuous cavity walls must not exceed 12 metres; above 12, metres the maximum height of continuous cavity walls must not exceed 7 metres. In both cases, breaks should be in the form of continuous horizontal cavity trays and weepholes discharging to the outside.
- the specifier must take extra care when detailing to ensure that the introduction of the insulation does not affect the weather resistance of the wall. Above average site supervision is recommended during installation of the product.
- where, for structural reasons, the cavity width is reduced, eg by the intrusion of ring beams, a minimum residual cavity width of 25 mm must be maintained and extra care must be taken with fixings and weatherproofing, eg the inclusion of cavity trays with weepholes.

5 Practicability of installation

The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Thermal performance



6.1 Calculations of the thermal transmittance (U value) of specific external wall constructions should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006, using the thermal conductivity* (λ_D) values shown in Table 3 and a foil surface emissivity (ϵ) of 0.2.

Table 3 Thermal conductivity

Insulation thickness (mm)	Thermal conductivity* ($W \cdot m^{-1} \cdot K^{-1}$)
< 45	0.021
≥ 45	0.020

6.2 The U value of a completed wall will depend on the selected insulation thickness, number and type of fixings, the insulating value of the substrate masonry and its internal finish. Calculated U values for example constructions are given in Table 4.

Table 4 Example U values⁽¹⁾ – partial fill insulation (50 mm residual cavity)

U value ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness (mm)	
	13 mm dense plaster, 100 mm dense block	Plasterboard on dabs, 100 mm AAC block
0.18	100	85
0.19	95	75
0.25	70	50
0.26	65	50
0.27	60	45
0.30	55	40
0.35	45	30

(1) The above 'U' value calculations are based on the following:

- 5 mm increments of product thickness, rounded upwards
- wall ties — mild steel, 2.5 per m^2 , 12.5 mm^2 cross-section
- 102 mm brick with conductivity $0.77 W \cdot m^{-1} \cdot K^{-1}$
- 50 mm cavity
- 100 mm dense block with conductivity $1.13 W \cdot m^{-1} \cdot K^{-1}$ or
- 100 mm AAC block with conductivity $0.12 W \cdot m^{-1} \cdot K^{-1}$ bridged by mortar (6.7%) with conductivity $0.88 W \cdot m^{-1} \cdot K^{-1}$
- 13 mm dense plaster with conductivity $0.57 W \cdot m^{-1} \cdot K^{-1}$ or
- 12.5 mm plasterboard with conductivity $0.21 W \cdot m^{-1} \cdot K^{-1}$, on 15 mm dabs (20%) with conductivity $0.43 W \cdot m^{-1} \cdot K^{-1}$.

6.3 The product can contribute to maintaining continuity of thermal insulation at junctions between elements. For Accredited Construction Details the corresponding ψ -values (ψ) in BRE Information Paper IP 1/06, Table 3 may be used in carbon emission calculations in Scotland and Northern Ireland. Detailed guidance for other junctions and on limiting heat loss by air infiltration can be found in:

England and Wales — Approved Documents to Part L and for new thermal elements to existing buildings, Accredited Construction Details (version 1.0). See also SAP 2009 The Government's Standard Assessment Procedure for Energy Rating of Dwellings, Appendix K and the *iSBEM User Manual* for new-build

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

7 Liquid water penetration



7.1 Where the product is used in situations where it bridges the damp-proof course (dpc) in walls, dampness from the ground will not pass through to the inner leaf provided the wall is detailed in accordance with the requirements and provisions of the national Building Regulations:

England and Wales — Approved Document C, section 5

Scotland — Mandatory Standard 3.4, clauses 3.4.1⁽¹⁾⁽²⁾ and 3.4.5⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet C, Sections 6.3 to 6.6.

7.2 Constructions incorporating the product, and built in accordance with the Standards listed in section 4.2, will resist the transfer of precipitation to the inner leaf and satisfy the national Building Regulations:

England and Wales — Approved Document C, section 5

Scotland — Mandatory Standard 3.10, clauses 3.10.1⁽¹⁾⁽²⁾ and 3.10.3⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet C, section 6.

7.3 In all situations, it is particularly important to ensure during installation that:

- wall ties are installed correctly and are thoroughly clean
- excess mortar is cleaned from the cavity face of the leading leaf and any debris removed from the cavity
- mortar droppings are cleaned from the exposed edges of installed slabs
- insulation boards are properly installed and butt-jointed
- installation is carried out to the highest level on each wall, or the top edge of the insulation is protected by a cavity tray
- at lintel level, a cavity tray, stop ends and weep holes are provided
- cavity battens and/or boards are used during construction to prevent bridging by mortar droppings
- dpc's at ground level do not project into the cavity as they can form a trap for mortar bridging
- raked or recessed mortar joints are avoided in very severe exposure areas.

8 Condensation

Surface condensation



8.1 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point, and the junctions with other elements are designed in accordance with the guidance referred to in section 6.3 of this Certificate.



8.2 For buildings in Scotland, wall constructions will be acceptable when the thermal transmittance (U value) does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point, and the junctions with other elements are designed in accordance with the guidance referred to in BS 5250 : 2011 Annex G. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6.3 of this Certificate.

Interstitial condensation



8.3 Walls will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011, Annexes D and G and the relevant guidance.

8.4 For the purposes of assessing the risk of interstitial condensation, the insulation core vapour resistivity may be taken as approximately $439 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$ and a resistance value of $111 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$ for each individual foil-facing.

8.5 If the product is to be used in the external wall of rooms expected to have high humidity, care must be taken to provide adequate permanent ventilation to avoid possible problems from the formation of interstitial condensation in the internal wall leaf.

9 Behaviour in relation to fire



9.1 The product has a reaction to fire classification of Class F* to BS EN 13501-1 : 2007.

9.2 The requirements of the national Building Regulations relating to fire spread in cavity walls can be met in buildings of all purpose groups without the need for cavity barriers, provided the construction complies with the provisions detailed in:

England and Wales — Approved Document B, Volume 1, Diagram 13, and Volume 2, Diagram 34

Northern Ireland — Technical Booklet E, Diagram 4.5.

9.3 For buildings subject to the Building Standards in Scotland, cavity barriers are not required to limit the area of a cavity or at junctions with other wall cavities. Cavity barriers are required around openings, penetrations and junctions with roof or floor cavities, with reference to clauses 2.4.1⁽¹⁾⁽²⁾, 2.4.2⁽¹⁾⁽²⁾, 2.6.5⁽¹⁾, and 2.6.6⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

9.4 For constructions not covered by sections 9.2 and 9.3, cavity barriers must be provided to comply with:


England and Wales — Approved Document B, Volume 1, Section 6, and Volume 2, Section 9

Scotland — Mandatory Standard 2.4, clauses 2.4.1⁽¹⁾⁽²⁾, 2.4.2⁽¹⁾⁽²⁾, 2.4.7⁽¹⁾ and 2.4.9⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet E, Paragraphs 4.36 to 4.39.

 9.5 The product is not classified as 'non-combustible' or of 'limited combustibility', but may be used without height restriction in a wall on, or less than 1 m from, a relevant boundary provided it is installed in a cavity that is between two leaves of masonry at least 75 mm thick, and which has a cavity barrier around all openings in the wall and at the top of the wall head. The use of the product in constructions not meeting this specification is limited to 18 m in height.

9.6 Cavity walls should always have a cavity closer at the top of the cavity and around openings. The material must not be taken past fire stops. If fire does penetrate into an unventilated cavity, the amount of air present will be insufficient to support combustion and flame spread will be minimal.

10 Proximity of flues and appliances

When installing the product in close proximity to certain flue pipes and/or heat producing appliances, the relevant provisions of the national Building Regulations are applicable:

England and Wales — Approved Document J, sections 1 to 4

Scotland — Mandatory Standard 3.19, clauses 3.19.1⁽¹⁾⁽²⁾ to 3.19.9⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).


(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet L, section 2.

11 Maintenance

As the product is confined within the wall cavity and it has suitable durability (see section 12), maintenance is not required.

12 Durability

 The product is unaffected by the normal conditions in a wall, and it is durable, rot-proof, water resistant and sufficiently stable to remain effective as insulation for the life of the building.

Installation

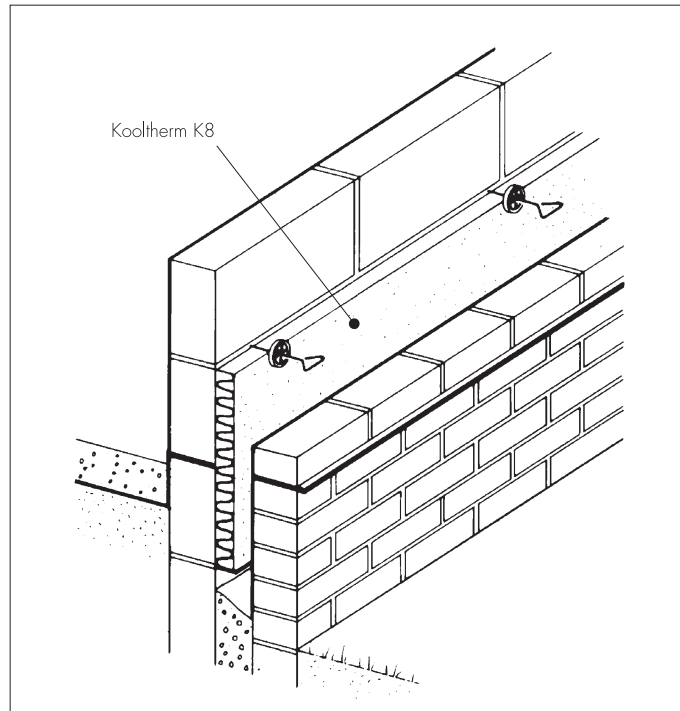
13 General

It is recommended that the inner leaf is constructed ahead of the outer leaf, as the product is fastened to the cavity face of the inner leaf. It is essential that the spacing of wall ties/clips allows one long edge of each board to be secured at a minimum of two points.

14 Procedure

14.1 A section of the inner leaf is built with the first row of wall ties, at approximately 600 mm horizontal spacing, where the insulation is to begin. It is recommended that the wall ties are not placed directly on the dpc. The first run of the product may commence below dpc level, so as to provide some edge insulation for the floor (see Figure 1).

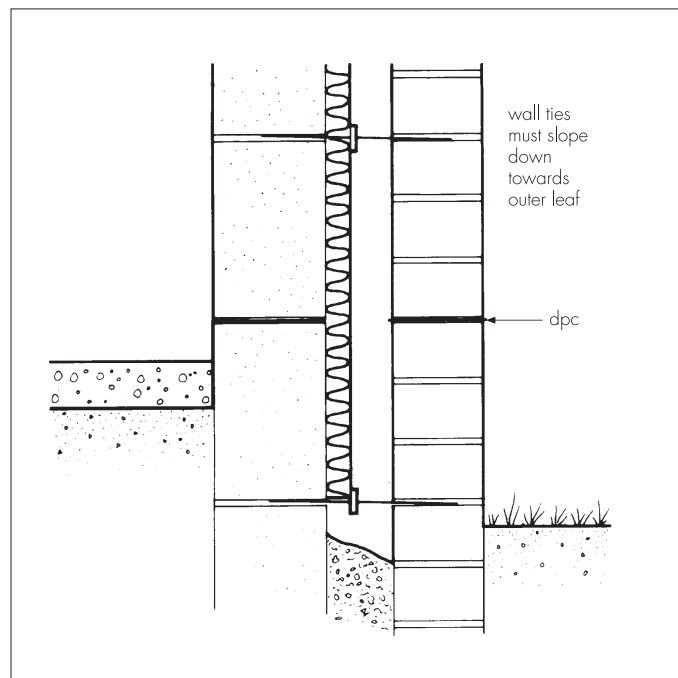
Figure 1 First run of boards



14.2 The leading leaf is built up to the required height, with wall ties placed at a vertical height of 450 mm ensuring the drip of the tie is located halfway across the residual cavity width. Excess mortar is cleaned from the cavity face of the leading leaf, and the product is placed on the wall ties, behind the retaining clips, to form a closely butt-jointed run.

14.3 The second row of wall ties is fitted to retain the tops of the product. It is essential that all wall ties slope downwards towards the outer leaf (see Figure 2) and at centres not exceeding 900 mm to ensure that each board is secured at a minimum of three points. It is also important that the first row of insulation boards should not be in contact with the ground.

Figure 2 Detail of wall ties



14.4 Additional ties may be required to satisfy the structural requirements of BS EN 845-1 : 2013, BS EN 1996-1-1 : 2005, BS EN 1996-2 : 2006 and BS EN 1996-3 : 2006 to ensure adequate retention of boards or cut pieces.

14.5 The following leaf is built up to the level of the top of the boards.

14.6 The product should be butted with vertical joints staggered. The product and wall ties should be staggered as construction proceeds and carried up to the highest level of wall, except where protected by a cavity tray.

Mortar droppings

14.7 After each section of the leading leaf is built, excess mortar should be removed from the cavity face and mortar droppings cleaned from exposed edges of the installed board, before installation of the next run of boards. Use of a cavity board or a cavity batten will protect the installed board edges and help to keep the cavity clean as the following leaf is built (see Figures 3 and 4).

Figure 3 Use of cavity batten

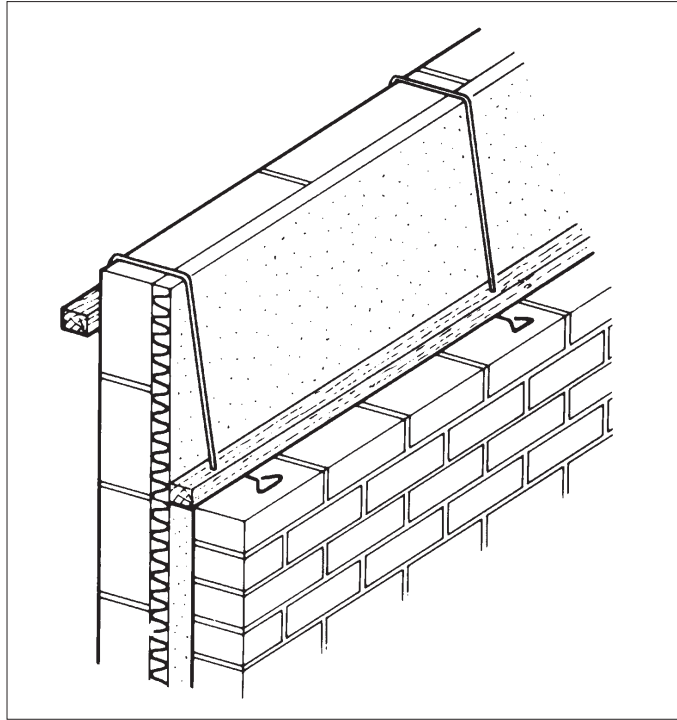
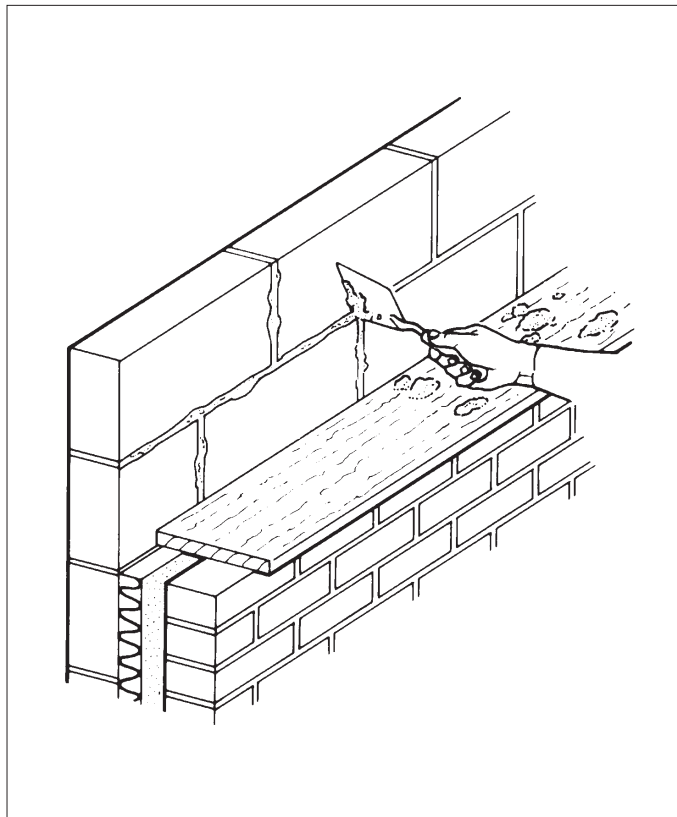


Figure 4 Use of cavity board



Wall openings

14.8 Where openings such as doors and windows are in close proximity, it is recommended that a continuous lintel or cavity tray is used. Individual lintels or cavity trays should have stopends and be adequately drained.

Cut pieces

14.9 The product can be cut, using a sharp knife or fine-toothed saw, to fit openings, eg around windows, doors and airbricks. It is essential that cut pieces completely fill the spaces for which they are intended and are adequately secured

Technical Investigations

15 Tests

Results of tests were assessed to determine:

- thermal conductivity
- emissivity.

16 Investigations

16.1 An examination of data was made to analyse:

- thermal conductivity
- dimensional accuracy
- compressive strength
- dimensional stability under specific temperature and humidity conditions
- water absorption
- water vapour transmission
- reaction to fire.

Bibliography

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

BS 5618 : 1985 *Code of practice for thermal insulation of cavity walls (with masonry or concrete inner and outer leaves) by filling with urea-formaldehyde (UF) foam systems*

BS 8000-3 : 2001 *Workmanship on building sites — Code of practice for masonry*

BS EN 845-1 : 2013 *Specification for ancillary components for masonry — Ties, tension straps, hangers and brackets*

BS EN 1996-1-1 : 2005 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*

NA to BS EN 1996-1-1 : 2005 *UK National Annex to Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*

BS EN 1996-1-2 : 2005 *Eurocode 6 : Design of masonry structures — General rules — Structural fire design*

NA to BS EN 1996-1-2 : 2005 *UK National Annex to Eurocode 6 : Design of masonry structures — General rules — Structural fire design*

BS EN 1996-2 : 2006 *Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*

NA to BS EN 1996-2 : 2006 *UK National Annex to Eurocode 6 : Design of masonry structures — Design considerations, selection of materials and execution of masonry*

BS EN 1996-3 : 2006 *BS EN 1996-3 : 2006 Eurocode 6 : Design of masonry structures : Simplified calculation methods for unreinforced masonry structures*

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BS EN 13501-1 : 2007 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

BS EN 13914-1 : 2005 *Design, preparation and application of external rendering and internal plastering — External rendering*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

BS EN ISO 13166 : 2012 *Thermal insulation products for buildings — Factory made phenolic foam (PF) products — Specification*

BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*

BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*

BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

17.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

17.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.